原著論文

暑熱環境下における長時間運動時のパフォーマンス低下と体温調節機能および循環系機能の関連

Effect of cardiovascular and thermoregulatory responses on maintaining performance during prolonged exercise in a hot environment

金谷　和幸[1)]　村川　増代[1)・2)]　河端　隆志[1)]
Kazuyuki Kanatani [1)]　Masuyo Murakawa [1)・2)]　Takashi Kawabata [1)]

Abstract

The aim of the present study was to examine the effect of cardiovascular and thermoregulatory responses on maintaining performance during prolonged exercise in a hot environment. Seven trained subjects(3males, 4females)completed a submaximal (60%VO_2max)constant load exercise test for 50 min at 25℃(NORM) and 32℃(HOT) (RH;40%). During exercise in a HOT compared with NORM, the power output was not maintained from 38 min (NORM:115±11W, HOT:107±9W) and stroke volume from 33 min(NORM:116±7ml, HOT:106±4ml) decreased significantly ($p<0.05$). Esophageal temperature (Tes) in HOT increased significantly from 7 min (NORM:36.97±0.11℃, HOT:37.15±0.07℃)at rest to the end of exercise (NORM:37.31±0.12℃, HOT:38.13±0.14℃) compared with NORM ($p<0.05$). It is suggested that an impaired maintain power output during prolonged exercise in a hot environment may be suppression of thermoregulation response caused by SV reduction. This appears to form part of an anticipatory response which impaired power output to reduce heat production, thereby ensuring that thermal homeostasis is maintained during exercise in the hot environment.

キーワード：暑熱環境、体温調節機能、循環系機能、運動パフォーマンス、仕事量
hot environment, thermoregulatory, cardiovascular, exercise performance, power output

暑熱環境下での身体運動において，生体では運動を継続するために要求される骨格筋への筋血流量の維持と体内で産生された熱を放散するための皮膚血流量の維持という 2 者の制御機能が高次元で働く．そのため，心・循環系機能と体温調節反応は密接な関係があるといえる．

暑熱環境下における運動時の深部体温および皮膚温の動態は通常環境下と比較して上昇傾向にあり，また運動パフォーマンスも低下することが報告されている（Nielsen et al., 1993; Nybo

1）関西大学大学院　人間健康研究科　*Kansai University Graduate School of Health and Well-being*
2）明治国際医療大学　*Meiji University of Integrative Medicine*